

"Philofluid" turbulent flow database

*Original*

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# PHILOFLUID DATABASE

(in completion)

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Direct numerical simulations of the interaction between two homogeneous and isotropic regions

$E_1/E_2$ : kinetic energy ratio

$\ell_1/\ell_2$ : integral scale ratio

$Re_\lambda$ : Taylor microscale Reynolds number

$Sc$ : Schmidt number (scalar transport)

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## 1 2D Shearless mixing

### 1.1 Grid $1024^3$ , $E_1/E_2 = 6,6$ $\ell_1/\ell_2 = 1$

Physical collocation:

- [Polito - DIMEAS](#), Network disk system Lacie A  $\rightarrow$  root disk
- [Polito - DIMEAS](#), Computer “dns3”, disco 2

Address:

130.192.25.60/2D\_Mixing/Data/EE66/  
130.192.25.49/DATA\_SHARED/2D\_Mixing/1024/LAURIS/EE66/

Size: 4 Gb

### 1.2 Grid $1024^2$ , $E_1/E_2 = 12$ $\ell_1/\ell_2 = 1$

Physical collocation:

- [Polito - DIMEAS](#), Network disk system Lacie A  $\rightarrow$  root disk

Address:

130.192.25.60/2D\_Mixing/Data/EE12/

Size: 4 Gb

### 1.3 Grid $1024^2$ , $E_1/E_2 = 40$ $\ell_1/\ell_2 = 1$

Physical collocation:

- [Polito - DIMEAS](#), Network disk system Lacie A  $\rightarrow$  root disk
- [Polito - DIMEAS](#), Computer “dns3”, disco 2

Address:

130.192.25.60/2D\_Mixing/Data/EE40/  
130.192.25.49/DATA\_SHARED/2D\_Mixing/1024/LAURIS/EE40/

Size: 80 Gb

#### 1.4 Grid $1024^2$ , $E_1/E_2 = 300$ $\ell_1/\ell_2 = 1$

Physical collocation:

– **Polito - DIMEAS**, Network disk system Lacie A  $\rightarrow$  root disk

Address:

130.192.25.60/2D\_Mixing/Data/EE300/

Size: 80 Gb

#### 1.5 Grid $1024^2$ , $E_1/E_2 = 10^6$ $\ell_1/\ell_2 = 1$

Physical collocation:

– **Polito - DIMEAS**, Network disk system Lacie A  $\rightarrow$  root disk

Address:

130.192.25.60/2D\_Mixing/Data/EE10\_6/

Size: 80 Gb

#### 1.6 Grid $1024^2$ , $E_1/E_2 = 6,6$ $\ell_1/\ell_2 = 1$ , **passive scalar** $Sc = 1$

Physical collocation:

– **Polito - DIMEAS**, Network disk system Lacie B  $\rightarrow$  usb disk B1

Address:

130.192.25.166/Lacie (usb)/scalare\_passivo/2Dscalar/PASS/SCHMIDT\_1\_EE66/

Size: 80 Gb

#### 1.7 Grid $1024^2$ , $E_1/E_2 = 1$ $\ell_1/\ell_2 = 1$ , **passive scalar** $Sc = 1$

Physical collocation:

– **Polito - DIMEAS**, Network disk system Lacie B  $\rightarrow$  usb disk B1

Address:

130.192.25.166/Lacie (usb)/scalare\_passivo/PASS/SCHMIDT\_1\_EE0/

Size: 80 Gb

#### 1.8 Grid $1024^2$ , $E_1/E_2 = 1$ and $10^4$ , $\ell_1/\ell_2 = 1$ , **lagrangian particles**

Physical collocation:

– **Polito - DIMEAS**, Computer “dns3”, disco 2

Address:

130.192.25.49/DATA\_SHARED/2D\_Mixing/1024/LAURIS/LAGRANGIAN/

Size: 80 Gb

## 2 3D Shearless mixing

### 2.1 Data $Re_\lambda = 45$ , $E_1/E_2 = 6, 7$ $\ell_1/\ell_2 = 1$

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A2
- **CINECA**, iCFD database

Address:

130.192.25.60/Disco2/Re45/E6\_L1/

Size: 5 Gb

### 2.2 Data $Re_\lambda = 45$ , $E_1/E_2 = 40$ $\ell_1/\ell_2 = 1$

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A2
- **CINECA**, iCFD database

Address:

130.192.25.60/Disco2/Re45/E6\_L40/

Size: 5 Gb

### 2.3 Data $Re_\lambda = 45$ , $E_1/E_2 = 40$ $\ell_1/\ell_2 = 0.6$

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A2

Address:

130.192.25.60/Disco2/Re45/E40\_06/

Size: 5 Gb

### 2.4 Data $Re_\lambda = 45$ , $E_1/E_2 = 100$ $\ell_1/\ell_2 = 1$

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A2
- **CINECA**, iCFD database

Address:

130.192.25.60/Disco2/Re45/E100\_L1/

Size: 5 Gb

### 2.5 Data $Re_\lambda = 45$ , $E_1/E_2 = 300$ $\ell_1/\ell_2 = 1$

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A2
- **CINECA**, iCFD database

Address:

130.192.25.60/Disco2/Re45/E300\_L1/

Size: 5 Gb

## 2.6 Data $Re_\lambda = 45$ , $E_1/E_2 = 10^6$ $\ell_1/\ell_2 = 1$ , domain $4\pi$ and $8\pi$

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A2
- **CINECA**, iCFD database

Address:

130.192.25.60/Disco2/Re45/E10\_6\_L1/

Size: 10 Gb

## 2.7 Data $Re_\lambda = 45$ , $E_1/E_2 = 6, 7$ $\ell_1/\ell_2 = 0.6$

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A2
- **PoliTO - DIMEAS**, Computer “avdotia2”
- **PoliTO - DIMEAS**, CD “B128”

Address:

130.192.25.60/Disco2/Re45/E6\_L06/  
130.192.25.141/home/michele/cubo/B/  
CD: B128

Size: 5 Gb

## 2.8 Data $Re_\lambda = 45$ , $E_1/E_2 = 6, 7$ $\ell_1/\ell_2 = 1.5$

Physical collocation:

- **PoliTO - DIMEAS**, Computer “avdotia2”
- **PoliTO - DIMEAS**, CD “S128”

Address:

130.192.25.141/home/michele/cubo/S/  
CD: S128

Size: 5 Gb

## 2.9 Data $Re_\lambda = 45$ , $E_1/E_2 = 6, 7$ $\ell_1/\ell_2 = 2.1$

Physical collocation:

- **PoliTO - DIMEAS**, Computer “avdotia2”
- **PoliTO - DIMEAS**, CD “C128”

Address:

130.192.25.141/home/michele/cubo/C2/  
CD: C128

Size: 5 Gb

### 2.10 Data $Re_\lambda = 71$ , $E_1/E_2 = 6,7$ $\ell_1/\ell_2 = 1$

Physical collocation:

- **PoliTO - DIMEAS**, Computer “avdotia2”

Address:

130.192.25.141/home/disk4/cubo/prova256\_omp\_sp/omp170\_340/

Size: 25 Gb

### 2.11 Data $Re_\lambda = 150$ , $E_1/E_2 = 6,7$ $\ell_1/\ell_2 = 1$

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A2
- **CINECA**, “cart” tape archive, user “miovieno”, dir. “scal150”

Address:

130.192.25.60/Disco2/Re150/E6\_L1\_R150/

Cineca: miovieno//cart//scal150/ file: s150\_u\*.tar

Size: 400 Gb

### 2.12 Data $Re_\lambda = 150$ , $E_1/E_2 = 1$ $\ell_1/\ell_2 = 1.5$

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A2

Address:

130.192.25.60/Disco2/Re150/E1\_L15\_R150/

Size: 350 Gb

### 2.13 Data $Re_\lambda = 150$ , $E_1/E_2 = 1$ $\ell_1/\ell_2 = 2.1$

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A2
- **CINECA**, “cart” tape archive, user “miovieno”, dir. ‘elle21/’.

Address:

130.192.25.60/Disco2/Re150/E1\_L21\_R150/

Cineca: miovieno//cart//elle21/

Size: 350 Gb

### 2.14 Data $Re_\lambda = 150$ , $E_1/E_2 = 1$ $\ell_1/\ell_2 = 2.8$

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A2
- **CINECA**, “cart” tape archive, user “miovieno”, dir. ‘elle28/’.

Address:



130.192.25.60/Disco2/Re150/E1\_L28\_R150/  
Cineca: miovieno//cart//elle28/

Size: 350 Gb

1300 time instans in 1.5 eddy turnover times for Lagrangian analysis:

Physical collocation:

– **CINECA**, SP6 scratch disk, user “lgallana”.

Size: 6 Tb

### 2.15 Data $Re_\lambda = 250$ , $E_1/E_2 = 1$ $\ell_1/\ell_2 = 2.4$

Physical collocation:

– **PolITO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disks A2 and A1

– **CINECA**, “cart” tape archive, user “miovieno”, dir. “m250”.

Address:

130.192.25.60/Disco2/Re250/L24/  
130.192.25.60/Disco1/Mescolamenti\_3D/Re250/  
Cineca: miovieno//cart//m250/

Size: 500 Gb

### 2.16 Data $Re_\lambda = 150$ , $E_1/E_2 = 6,7$ $\ell_1/\ell_2 = 1$ , passive scalar $Sc = 1$

Physical collocation:

– **CINECA**, “cart” tape archive, user “miovieno”, dir. “scal150”

– **PolITO - DIMEAS**, Network disk system Lacie B  $\rightarrow$  usb disk B1

Address:

Cineca: miovieno//cart//scal150/  
130.192.25.166/Lacie (usb)/scalare\_passivo/3Dscalar/

Size: 130 Gb

### 2.17 Data $Re_\lambda = 150$ , $E_1/E_2 = 1$ $\ell_1/\ell_2 = 1$ , passive scalar $Sc = 1$

Physical collocation:

– **CINECA**, “cart” tape archive, user “miovieno”, dir. “scalunif”

Address:

Cineca: miovieno//cart//scalunif/

Size: 500 Gb (velocity fields included)

### 3 Shearless mixing in presence of stable stratification

#### 3.1 Data $Re_\lambda = 45$ , $E_1/E_2 = 6, 7$ $\ell_1/\ell_2 = 1$ , $Fr = 1$

Physical collocation:

– **PoliTO - Labinf**, user “snft4”

Address:

`cclix7.polito.it`    `flussi_stratificati/re45/Fr1`

Size: 60 Gb

#### 3.2 Data $Re_\lambda = 45$ , $E_1/E_2 = 6, 7$ $\ell_1/\ell_2 = 1$ , $Fr = 5$

Physical collocation:

– **PoliTO - Labinf**, user “snft4”

Address:

`cclix7.polito.it`    `flussi_stratificati/re45/Fr5`

Size: 60 Gb

#### 3.3 Data $Re_\lambda = 45$ , $E_1/E_2 = 6, 7$ $\ell_1/\ell_2 = 1$ , $Fr = 10$

Physical collocation:

– **PoliTO - Labinf**, user “snft4”

Address:

`cclix7.polito.it`    `flussi_stratificati/re45/Fr10`

Size: 60 Gb

---

## 4 Hydrodynamic Stability of Shear Flows

Address: `130.192.25.166/Lacie(usb)#2` and `130.192.25.166/disco_madre`

Physical Collocation: **PoliTO - DIMEAS**, Network disk system Lacie B

Total size: 4 Tb (included data at **PoliTO - Labinf**, currently under reorganization)

#### 4.1 Poiseuille Channel Flow ( $\phi$ : angle of obliquity, $k$ : polar wavenumber)

- $Re = 500$ ,  $\phi = 0, \pi/4, \pi/2$ , symmetric and antisymmetric initial conditions,  $k \in [0.05, 1000]$ .
- $Re = 10000$ ,  $\phi = 0, \pi/4, \pi/2$ , symmetric and antisymmetric initial conditions,  $k \in [0.05, 1000]$ .

#### 4.2 Wake Flow ( $\phi$ : angle of obliquity, $x_0$ : longitudinal wake section, $k$ : polar wavenumber)

- $Re = 30$ ,  $x_0 = 10, 50$ ,  $\phi = 0, \pi/4, \pi/2$ , symmetric and antisymmetric initial conditions,  $k \in [0.1, 500]$ .
- $Re = 50$ ,  $x_0 = 10$ ,  $\phi = 0, \pi/4, \pi/2$ , symmetric and antisymmetric initial conditions,  $k \in [0.1, 500]$ .
- $Re = 100$ ,  $x_0 = 10, 50$ ,  $\phi = 0, \pi/4, \pi/2$ , symmetric and antisymmetric initial conditions,  $k \in [0.1, 500]$ .

#### 4.3 Blasius Boundary Layer Flow ( $\phi$ : angle of obliquity, $\beta$ : pressure gradient, $k$ : polar wavenumber)

- $Re_{\delta^*} = 100$ ,  $\phi = 0, \pi/4, \pi/2$ ,  $k \in [0.02, 2]$ .
- $Re_{\delta^*} = 5000$ ,  $\phi = 0, \pi/4, \pi/2$ ,  $k \in [0.02, 2]$ .

#### 4.4 Cross-Flow Boundary Layer ( $\phi$ : angle of obliquity, $\beta$ : pressure gradient, $\theta$ : cross-flow angle $k$ : polar wavenumber)

- $Re_{\delta^*} = 100$ ,  $\beta = 1, -0.1988$ ,  $\phi = 0, \pi/4, \pi/2$ ,  $\theta = \pi/6, \pi/4, \pi/3$ ,  $k \in [0.02, 2]$ .
- $Re_{\delta^*} = 5000$ ,  $\beta = 1, -0.1988$ ,  $\phi = 0, \pi/4, \pi/2$ ,  $\theta = \pi/6, \pi/4, \pi/3$ ,  $k \in [0.02, 2]$ .

---

## 5 Cavity flow (cavity in a channel)

### 5.1 $Re = 150$

Physical collocation:

– [PoliTO - DIMEAS](#), Computer “dns2”

Address:

130.192.25.86/home/michele/cavita2011/laminar/re\_150\_prb/

### 5.2 $Re = 250$

Physical collocation:

– [PoliTO - DIMEAS](#), Computer “dns2”

Address:

130.192.25.86/home/michele/cavita2011/laminar/re\_250\_prb/

### 5.3 $Re = 2900$

Physical collocation:

– [PoliTO - DIMEAS](#), Computer “dns2”

Address:

130.192.25.86/home/michele/cavita2011/laminar/turbulent/

Size: 40 Gb

---

## 6 Channel flow

Total size: 10 Gb

### 6.1 $Re_\tau = 180$ , Les b.c.A, $y^+ = 2$ and $y^+ = 5$

Physical collocation:

– [PoliTO - DIMEAS](#), CD “Les A - Re180 - uvw  $y^+=2$ , no comm.”

– [PoliTO - DIMEAS](#), CD “Les A - Re180 - uvw  $y^+=5$ , no comm.”

### 6.2 $Re_\tau = 180$ , Les b.c.B, $y^+ = 2$ and $y^+ = 5$

Physical collocation:

– [PoliTO - DIMEAS](#), CD “Les B - Re180 - uvw  $y^+=2$ , no comm.”

– [PoliTO - DIMEAS](#), CD “Les B - Re180 - uvw  $y^+=5$ , no comm.”

### 6.3 $Re_\tau = 180$ , Les b.c.A, $y^+ = 2$ and $y^+ = 5$ , noncommutation correction

Physical collocation:

– [PoliTO - DIMEAS](#), CD “Les A - Re180 - uvw  $y^+=2$ , comm.”

– [PoliTO - DIMEAS](#), CD “Les A - Re180 - uvw  $y^+=5$ , comm.”

### 6.4 $Re_\tau = 180$ , Les b.c.B, $y^+ = 2$ and $y^+ = 5$ , noncommutation correction

Physical collocation:

– [PoliTO - DIMEAS](#), CD “Les B - Re180 - uvw  $y^+=2$ , comm.”

– [PoliTO - DIMEAS](#), CD “Les B - Re180 - uvw  $y^+=5$ , comm.”

### 6.5 $Re_\tau = 590$ , Les b.c.A, $y^+ = 2$ and $y^+ = 5$

Physical collocation:

– [PoliTO - DIMEAS](#), CD “Les A - Re590 - uvw  $y^+=2$ , no comm.”

– [PoliTO - DIMEAS](#), CD “Les A - Re590 - uvw  $y^+=5$ , no comm.”

## 6.6 $Re_\tau = 590$ , Les b.c.B, $y^+ = 2$ and $y^+ = 5$

Physical collocation:

- **PoliTO - DIMEAS**, CD “Les B - Re590 - uvw  $y^+=2$ , no comm.”
- **PoliTO - DIMEAS**, CD “Les B - Re590 - uvw  $y^+=5$ , no comm.”

## 6.7 $Re_\tau = 590$ , Les b.c.A, $y^+ = 2$ and $y^+ = 5$ , noncommutation correction

Physical collocation:

- **PoliTO - DIMEAS**, CD “Les A - Re590 - uvw  $y^+=2$ , comm.”
- **PoliTO - DIMEAS**, CD “Les A - Re590 - uvw  $y^+=5$ , comm.”

## 6.8 $Re_\tau = 590$ , Les b.c.B, $y^+ = 2$ and $y^+ = 5$ , noncommutation correction

Physical collocation:

- **PoliTO - DIMEAS**, CD “Les B - Re590 - uvw  $y^+=2$ , comm.”
  - **PoliTO - DIMEAS**, CD “Les B - Re590 - uvw  $y^+=5$ , comm.”
- 

# 7 Filtered turbulent fields

Total size: 1,3 Tb

## 7.1 Original data (F.Toschi)

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A1

Address:

130.192.25.60/Disco1/Fabrizio/Toschi/

## 7.2 Filter class: “cross”

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A1

Address:

130.192.25.60/Disco1/Fabrizio/croce/

## 7.3 Filter class: “sphere”

Physical collocation:

- **PoliTO - DIMEAS**, Network disk system Lacie A  $\rightarrow$  usb disk A1

Address:

130.192.25.60/Disco1/Fabrizio/sfera/

## 7.4 Filter class: “filament”

Physical collocation:

– **PoliTO - DIMEAS**, Network disk system Lacie A → usb disk A1

Address:

130.192.25.60/Disco1/Fabrizio/filamento/

## 7.5 Filter class: “sheet”

Physical collocation:

– **PoliTO - DIMEAS**, Network disk system Lacie A → usb disk A1

Address:

130.192.25.60/Disco1/Fabrizio/sheet/